DOCUMENT RESUME

ED 298 345 CE 050 941

AUTHOR Doll, Lynda S.; Thompson, Dennis N.
TITLE The Instructional Effectiveness of the Microcomputer with an Elderly Population.
PUB DATE Apr 87
NOTE 11p.; Paper presented at the Annual Meeting of the American Educational Research Association (Washington, DC, April 20-24, 1987).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adult Education; *Age Differences; *Computer Assisted Instruction; Computer Graphics; *Courseware; Educational Research; *Instructional Design; *Instructional Effectiveness; Microcomputers; *Older Adults; Student Attitudes

ABSTRACT

A study compared the amount of contact and the attitudes of young and old individuals toward computers and computer-based instruction (CAI). Developmental differences were examined in the effectiveness of two instructional design features--the use of pictorial (graphics) versus highlighting--and extent of learner participation. Fifty elderly adults and 50 young adults were randomly assigned to five treatment groups--signaling, signaling/embedded questions, passive graphics, interactive graphics, and embedded questions. The five versions of the CAI lesson differed in the form of highlighting used and the extent to which learners had to respond actively. Following completion of the lesson, subjects took a prompted recall test. Subjects were also administered a survey assessing previous experience with computer-related technology and were pre- and posttested on attitudes toward computer-related technology. The main effect for highlighting was significant. Twenty percent of the elderly reported having used a microcomputer, compared with 98 percent of the young subjects. Both age groups were found to be slightly favorable toward CAI, and attitudes became slightly more favorable following participation in the study. Elderly subjects performed best on signaling; the young were best with graphics. Both age groups were relatively poor performers with interactive graphics. (YLB)

The Instructional Effectiveness of the Microcomputer with an Elderly Population

by

Lynda S Doll

Centers for Disease Control

and

Dennis N. Thompson

Georgia State University

Paper presented at the 71st American Educational Research Association Annual Meeting, Washington, DC, April 20-24, 1987

The Instructional Effectiveness of the Microcomputer with an Elderly Population

Despite the need for, and current growth in lifespan and adult education programs, there is still little empirical research on which to base program development (Arguso, 1980). Much of the extant literature has focused on disproving cognitive decline in the elderly, or comparing young and old on one or more cognitive factors. This research has been helpful in showing that most elderly individuals can continue to learn, and in helping to delineate those conditions which maximize learning in a laboratory situation. However, educational gerontologists must now go one step further, using their research to develop effective instructional materials for the elderly. The research described in this paper is an attempt to add to this relatively small body of literature by examining the use of a new instructional medium--the microcomputer--with an elderly population.

Computer-assisted instruction (CAI) is one of the newer and more promising educational technologies now in use with younger learners. An individualized method of instruction, CAI is typically designed to permit considerable student control over both the path and speed through a given module. Student participation is encouraged through the use of embedded

---

The research presented in this paper was supported by grant #86058 from the Georgia State University Research Grant Fund.

questions, with feedback to responses provided almost immediately. Color, graphics and other forms of highlighting unique to the microcomputer are used to draw student attention to key material (Alessi & Trollip, 1985).

Computer-based education has been widely accepted by the teaching profession. As of 1983, approximately 75% of the school buildings in this country had a total of over 630,000 computers available for instructional use. Furthermore, 62% of all teachers had used computers for instructional purposes. Research with children and young adults has consistently shown that CAI is at least as effective as traditional classroom methods (Kulik, Bangert, & Williams, 1983; Kulik, Kulik, & Cohen, 1980).

Arguso (1978), and Hoot and Hayslip (1983) have argued that the use of instructional technologies such as videodisk and CAI have the potential to reduce costs and reach large numbers of learners in educational delivery systems for the elderly. Danowski and Sacks (1980) have encouraged the research community to examine and provide input into the instructional design of software for the elderly. To date, however, while several authors have published reports describing computer literacy programs for this age group (Chin, 1984; Kearsley & Furlong, 1984; Krauss & Hoyer, 1984), no research has been found that examines the instructional effectiveness of this medium with an older population.

The research described in this paper explores two questions related to microcomputers and the elderly. First, the amount of

contact and the attitudes of young and old individuals toward computers and computer-based instruction are compared. Second, developmental differences are examined in the effectiveness of two instructional design features--the use of pictoral (graphics) versus verbal highlighting and the extent of learner participation required by the materials. These design features are an integral part of many CAI lessons.

Method

Subjects

The sample of young adults consisted of 50 subjects, ages 18-35, enrolled in a college-level course on developmental psychology. A sample of healthy, older adults consisted of 50 subjects, ages 59-87, who were recruited from senior citizen centers and a local chapter of the American Association of Retired Persons (AARP). All subjects were paid for their participation.

Materials and Procedures

Fifty elderly adults and fifty young adults were randomly assigned to one of five treatment groups--Signaling, Signaling/ Embedded Questions, Passive Graphics, Interactive Graphics, and Embedded Questions. Subjects in each treatment group read, via computer, the same 1,946 word lesson on medication problems and the older adult. The lesson, written on the 10th grade reading level (Dale-Chall, 1948) was presented across approximately 58 screens, one screen consisting of five to ten lines of text. Black was used as the background c lor throughout the text

portion of all lessons. Foreground (text) colors consisted of green, red, and gold. All text was written in 40-character mode.

The five versions of the CAI lesson, corresponding to the five treatment groups, differed in the form of highlighting used and the extent to which an active response was required on the part of the learner. In order to control for content, structure level, and placement of material, the same 12 highlighted idea units were highlighted in each version. These 12 highlighted idea units and 12 additional idea units which were not highlighted but were used in the recall test, were chosen using a method described by Johnson (1970). In the Signaling version a verbal restatement or paraphrase of each idea unit followed each highlighted idea unit. The Signaling Embedded questions version consisted of verbal restatements of idea units followed by embedded questions requiring an active response from the learner. The Passive Graphics version utilized line drawings or graphics to illustrate idea units. Interactive Graphics utilized the same graphics as the Passive Graphics version, with the addition of embedded questions to query the subject. Finally, the Embedded Question version consisted of verbal highlighting requiring an active response (embedded questions) following each of the 12 highlighted idea units.

Following completion of the lesson, subjects took a 24-item prompted recall test over text material. The test was designed so that 12 items were constructed from the 12 highlighted idea units found in each of the five versions of the lesson. The

remaining 12 items were taken from material in the text that had not been highlighted.

Subjects were also administered a 10-item survey assessing the previous experience with computer-related technology (Krauss & Hoyer, 1984). In addition, prior to, and after completing the lesson, subjects completed an 8-item survey assessing attitudes toward computer-based technology.

Results

From the survey assessing previous experience with computers, it was learned that the young were much more likely than the elderly to have had previous experience with microcomputers. Twenty-percent of the elderly reported having used a microcomputer, compared with 98% of the young subjects. Both age groups, however, were found to be slightly favorable toward computer-based instruction before first reading the CAI lesson. Following participation in the study, attitudes became slightly more favorable for both age groups, but the differences between the two testings were not significant.

A 2 x 5 x 2 (age x treatment x highlighted/nonhighlighted) split-plot analysis of variance, with repeated measures on highlighting was performed to determine if there were significant differences between the two age groups for type of treatment and highlighting. Scores on the first 50 items of the Quick Word Test (Borgatta and Corsini, 1964) were used as a covariate to match older and younger subjects on verbal ability. Significant main effects were found for age, F (1, 89) = 1296.51 $p < .001$,

and for highlighting, F (1,90) = 184.32, $p < .001$. Main effects for treatment were not significant. However, a significant age by treatment interaction was found F (1,89) = 10.18, $p < .02$.

The significant main effect for age favored the younger subjects and the significant main effect for highlighting favored the targeted items. The significant interaction between age and treatment was interpreted to mean that elderly subjects performed best on Signaling, while the young were best with Graphics. Members of both age groups were relatively poor performers with Interactive Graphics. The Newman-Kauls' Multiple Range Test indicated that there was not a significant difference in the performance of the two age groups who received Signaling. It appears that for subjects who received Signaling, the elderly were brought up to the level of performance of the younger subjects.

Discussion

The current study lends support to the argument that computer-assisted instruction is a viable instructional tool for use with adults of all ages. The fact that the main effect for highlighting was significant indicates that the treatments used were effective in helping subjects of both age groups recall material from the text. This should be of interest to future researchers developing CAI programs for the elderly in that these treatments were specifically designed to address some of the characteristics and advantages of computer-assisted instruction.

Of specific interest would be signaling which appears to be particularly effective with the elderly.

This set of findings also lends support to points previously found in the literature. The fact that graphics were effective with the younger subjects and signaling with the elderly and that interactive graphics was ineffective for both age groups supports Botwinick's (1984) point that combining mediational procedures serves to hinder rather than improve performance.

Following the presentation of these results, suggestions will also be provided regarding the development of CAI programs for use with the elderly.

References

Alessi, S. M. & Trollip, S. R. (1985). Computer-based instruction. Englewood Cliffs, N. J.: Prentice-Hall.

Arguso, V. M. (1978). Learning in the later years. New York: Academic Press.

Arguso, V. M. (1980). Guiding the older learner. Contemporary Educational Psychology, 5, 363-377.

Borgatta, E. F., & Corsini, R. J. (1964). Quick Word Test: Level I. New York: Harcourt, Bruce, and World.

Botwinick, J. (1984). Aging and behavior. New York: Springer.

Chin, K. (1984). The elderly learn to compute. Aging, 348, 4-7.

Dale, E. & Chall, J. (1948). A formula for predicting readability. Educational Research Bulletin, 27, 37-55.

Danowski, J. A., & Sacks, W. (1980). Computer communication with the elderly. Experimental Aging Research, 6, 125-135.

Hoot, J. L., & Hayslip, B. (1983). Microcomputer and the elderly: New directions for self-sufficiency and life-long learning. Educational Gerontologist, 9, 493-499.

Johnson, R. E. (1970). Recall of prose as a function of the importance of the linguistic units. Journal of Verbal Learning and Verbal Behavior. 9, 12-20.

Kearsley, G. P., & Furlong, M. J. (1984). Computer for kids over 60. Reading, MA: Addison-Wesley.

Krauss, I. K., & Hoyer, W. S. (1984). High technology and the older person: Age, sex and experience as moderators of attitude towards computers. In P. K. Robinson, J. Livingston, and J. E. Birren (Eds.) Aging and technology (pp. 349-350). New York: Plenum Press.

Kulik, J. A., Bangart, R. L., & Williams, G. W. (1983). Effects of computer based teaching on secondary school students. Journal of Education Psychology, 75, 19-26.

Kulik, J. A., Kulik, L. G., & Conen, P. A. (1980). Effectiveness of computer-based college teaching: A meta-analysis of findings. Review of Educational Research, 50, 525-544.